REMARKS

This is in full and timely response the Office Action dated November 6, 2006.

Claims 20-39 are currently pending in this application. *No new matter has been added.*

Reexamination in light of the following remarks is respectfully requested.

Allowable subject matter

Appreciation is expressed for the indication within paragraph 13 of the Office Action indicates that claim 20 contains allowable subject matter. Accordingly, claim 20 has been placed into independent form.

Allowance of the claims is respectfully requested.

Claim objections and rejections

While not conceding the propriety of these objections and rejections and in order to advance the prosecution of the above-identified application, claims 1-19 have been canceled.

Withdrawal of these objections and rejections is respectfully requested.

Newly added claims 21-39

Claims 20-22 - Claims 21-22 are dependent upon claim 20 and are allowable at least for this reason and at least for the additional features that these claims recite. Specifically:

Claim 21 is drawn to a radiation detector comprising the detection layer formed by the method according to claim 20.

Claim 22 is drawn to a radiation imaging apparatus comprising:

the radiation detector according to claim 21;

a plurality of charge accumulation capacitors for accumulating charges from said detection layer; and

a switching matrix substrate including switching devices arranged in array, wherein the switching devices read out charges of said plurality of charge accumulation capacitors.

Claims 23-34 - Claims 24-34 are dependent upon claim 23. Claim 23 is drawn to a method for producing a radiation detector comprising:

placing a supporting substrate and a source into a deposition chamber, said source being a mixture of a first material and a second material, said first material including at least one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride, said second material including at least one of $CdCl_2$ (cadmium chloride) or $ZnCl_2$ (zinc chloride);

reducing pressure within said deposition chamber;

heating said source, said source sublimating and adhering to said supporting substrate to form a detection layer.

Claim 33 is drawn to a radiation detector comprising the detection layer formed by the method according to claim 23.

Claim 34 is drawn to a radiation imaging apparatus comprising:

the radiation detector according to claim 23;

a plurality of charge accumulation capacitors for accumulating charges from said detection layer; and

a switching matrix substrate including switching devices arranged in array, wherein the switching devices read out charges of said plurality of charge accumulation capacitors.

The following description is provided for illustrative purposes and is not intended to limit the scope of the invention. The specification as originally filed at page 15, lines 12-24, provides the following.

> As the source S to be placed in the lower susceptor 35, a mixture of a first material including at least one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride) and a second material including at least one of CdCl.sub.2 (cadmium chloride) or ZnCl.sub.2 (zinc chloride) can be exemplified.
>
> For example, after placing and treating CdTe containing CdCl.sub.2 as the source S, the source S is replaced with ZnTe containing CdCl.sub.2 and the same treatment is conducted. As a consequence of this, a CdTe film containing Cl is formed as the first layer 9a of the detection layer 9 and a ZnTe film containing Cl is formed as the second layer 9b. The detection layer 9 may be formed by a single layer.

Agouridis - Agouridis arguably teaches a cadmium telluride photovoltaic radiation detector.

Referring now specifically to the diode 23 structure, the diode is made by cutting a 2-mm thick cylindrical wafer 39 from a commercially available *CdTe ingot* (Agouridis at column 3, lines 38-40). The ingots must be of high resistivity (greater than 10^8 ohm cm) p-type, *grown by the traveling heater method*, and doped with *chlorine* (Agouridis at column 3, lines 41-44).

However, Agouridis fails to disclose, teach, or suggest placing a supporting substrate and a source into a deposition chamber, said source being a mixture of a first material and a second material, said first material including at least one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride, said second material including at least one of $CdCl_2$ (cadmium chloride) or $ZnCl_2$ (zinc chloride).

McCandless - McCandless arguably teaches an all-vapor processing of p-type tellurium-containing II-VI semiconductor and ohmic contacts thereof. Figure 1 of McCandless arguably teaches that a deposition 12 of CdS and *CdTe films* onto a glass substrate occurs

(McCandless at column 3, lines 58-59). Figure 1 of McCandless arguably teaches that the film is then subjected to a *$CdCl_2$ vapor heat treatment 16* (McCandless at column 3, lines 60-61).

McCandless arguably teaches the presence of a reactant solid containment region 122 to contain reactant solids (McCandless at Figure 2, column 4, lines 16-17).

McCandless arguably teaches that, for example, during the cadmium chloride treatment phase, heating of the reaction zone susceptors can be stopped or otherwise changed to cease any further *vaporization of the cadmium chloride powder* (McCandless at column 4, lines 33-37).

Table 3 of McCandless arguably teaches the processing steps employed to fabricate solar cells from evaporated CdTe/CdS structures (McCandless at column 9, lines 32-34). This example describes the method and chemistry of the all-vapor process used to fabricate solar cells from evaporated CdTe films (McCandless at column 9, lines 31-32).

Specifically, Table 3 of McCandless teaches to:

1. Deposit 10-100 nm CdS onto TCO/glass;
2. Heat CdS at 420 °C with $CdCl_2$:O_2;
3. Deposit 2-6 μm CdTe;
4. Heat at 420 °C with $CdCl_2$:O_2;
5. React with Te/H_2;
6. Deposit 10-40 nm Cu and heat at 200°C;
7. Apply Current-Carrying Conductor.

Of particular note, step 1 of Table 3 indicates a deposition of CdS and step 2 indicates a heating of the CdS at 420 °C with $CdCl_2$:O_2.

Moreover, step 3 of Table indicates a deposition of CdTe and step 4 indicates a heating of the CdS at 420 °C with $CdCl_2$:O_2.

However, McCandless fails to disclose, teach or suggest placing a supporting substrate and a source into a deposition chamber, said source being a mixture of a first material and a second material, said first material including at least one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride, said second material including at least one of $CdCl_2$ (cadmium chloride) or $ZnCl_2$ (zinc chloride).

Schiebel - Schiebel arguably teaches an X-ray image detector.

However, Schiebel fails to disclose, teach or suggest placing a supporting substrate and a source into a deposition chamber, said source being a mixture of a first material and a second material, said first material including at least one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride, said second material including at least one of $CdCl_2$ (cadmium chloride) or $ZnCl_2$ (zinc chloride).

Claims 35-39 - Claims 36-39 are dependent upon claim 35. Claim 35 is drawn to a method for producing a radiation detector comprising:

placing a supporting substrate into a deposition chamber;

forming a detection layer on said supporting substrate, said detection layer being a polycrystal film comprising either one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride);

introducing a gas into said deposition chamber, said gas containing Cl;

performing a heat treatment on said detection layer and said supporting substrate, said heat treatment doping said detection layer with said Cl.

Claim 38 is drawn to a radiation detector comprising the detection layer formed by the method according to claim 35.

Claim 39 is drawn to a radiation imaging apparatus comprising:

the radiation detector according to claim 35;

a plurality of charge accumulation capacitors for accumulating charges from said detection layer; and

a switching matrix substrate including switching devices arranged in array, wherein the switching devices read out charges of said plurality of charge accumulation capacitors.

The following description is provided for illustrative purposes and is not intended to limit the scope of the invention. The specification as originally filed in the paragraph beginning at page 17, line 23, provides the following.

> As shown in FIG. 6, it is also possible that after forming a polycrystal film comprising either one of CdTe (cadmium telluride), ZnTe (zinc telluride) and CdZnTe (cadmium zinc telluride) or a laminate film of polycrystal including at least one thereof, Cl is doped by heating while supplying said detection layer 9 with vapor containing Cl atoms without placing the source in the lower susceptor 35.

Agouridis - Agouridis fails to disclose, teach, or suggest introducing a gas into a deposition chamber, wherein the gas contains Cl.

McCandless - McCandless arguably teaches that an exemplary vapor treatment reactor in accordance with features of the invented device is depicted in FIG. 2, as numeral 100 (McCandless at column 4, lines 5-7). Generally, a polycrystalline substrate 110, serving as the semi-conductor foundation material, is placed in a reaction chamber 112 so as to be juxtaposed to a heating source 114 (McCandless at column 4, lines 7-10). The reaction chamber further comprises a means of ingress 116 and egress 118 adapted to receive and evacuate a fluid 120 (McCandless at column 4, lines 10-12).

However, McCandless fails to disclose, teach, or suggest introducing a gas into a deposition chamber, wherein the gas contains Cl.

Schiebel - Likewise, Schiebel fails to disclose, teach, or suggest introducing a gas into a deposition chamber, wherein the gas contains Cl.

Allowance of the claims is respectfully requested.

Conclusion

For the foregoing reasons, all the claims now pending in the present application are allowable, and the present application is in condition for allowance. Accordingly, favorable reexamination and reconsideration of the application in light of the amendments and remarks is courteously solicited.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone Brian K. Dutton, Reg. No. 47,255, at 202-955-8753.

If any fee is required or any overpayment made, the Commissioner is hereby authorized to charge the fee or credit the overpayment to Deposit Account # 18-0013.

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Respectfully submitted,

By_____

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